

United States Department of Agriculture

Animal and Plant Health Inspection Service

National Wildlife Research Center



Studying Predator Behavior and Ecology to Improve Livestock and Wildlife Management

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National Wildlife Research Center Scientists Study Predation Behavior and Ecology

Wildlife Services' (WS) National Wildlife Research Center (NWRC) is the only Federal research facility devoted exclusively to resolving conflicts between people and wildlife through the development of effective, selective, and acceptable methods, tools, and techniques. NWRC's field station in Logan, UT, is the leading coyote ecology research complex in the world.

Data on predator population dynamics, ecology, and behavior are necessary to understand predation patterns on livestock, game species, and threatened and endangered species. This data is also needed for effective depredation management. While much data on

Groups Affected By These Problems:

- Livestock producers
- Wildlife managers
- Environmental organizations
- Land management agencies
- Pet owners

Major Research Accomplishments:

- WS showed that coyote population age structure is not an important determinant of coyote litter size.
- WS demonstrated that coyotes can exert significant negative impacts on smaller predators (swift fox, kit fox) and may decimate populations under appropriate conditions.
- WS provided additional evidence that territorial coyotes are primarily responsible for livestock predation although predation by non-territorial coyotes can be significant when prey are abundant and unprotected.



the subject exists, significant gaps remain with regard to predator-prey, predator-livestock, and predator-predator relationships. This project is adopting a multi-disciplinary approach to study interactions among predators, and the impact of predators, and predator removal on ecosystems and wildlife population dynamics. Results from these studies are fundamental to selective predator management. The information gathered will also be used to guide WS' operational programs.

Applying Science and Expertise to Wildlife Challenges

Population Analysis—NWRC and WS operations personnel analyzed reproductive patterns from a 12-year data set that involved 24 pairs of captive coyotes. Results showed that none of the females were reproductively active at one year of age. The next year, however, more than 80 percent developed placental scars (fetal implantation sites). The fraction with placental scars remained

between 80 percent and 90 percent through age 9, and then declined to less than 40 percent by age 12. Similarly, the mean number of placental counts per female rose rapidly through 2 to 3 years of age, remained stable until age 8, and then progressively declined to a very low level by age 12. Normal patterns of senility among coyotes are unlikely to provide significant relief from depredation because even among unexploited populations, coyotes over 6 years of age usually comprise less than 6 percent to 10 percent of the population.

Predator-Prey Relationships—The role that predation plays in the dynamics of prey populations is controversial. Our understanding of predator-prey relationships is complicated by a multitude of factors in the environment and a general lack of knowledge about most ecological systems. Various factors interact to regulate or limit prey populations and influence the degree to which predation affects prey populations. Some of these factors may create time lags or even cause generational effects of predation that often go unnoticed. At several large field sites across the western United States, NWRC field biologists are examining the impacts of coyotes and other predators on ecosystems that include smaller predators, big game, other prey types, and diverse flora. The goal is to obtain a better understanding of the dynamic roles that predators play in complex environments with and without human involvement.

Economics of Predation Management—Predation management can be controversial, especially when lethal management practices are necessary to effectively resolve conflicts. Some have claimed that the costs of predation management exceed the benefits and that Federal funds are being spent to subsidize a small number of livestock producers.

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NWRC scientists at the Logan field station are collaborating with the WS Utah State operational program to examine these issues. The available evidence suggests that livestock protection activities are economical, with benefit:cost ratios ranging from 3:1 to 27:1. Likewise, predation management activities to protect wildlife show benefit:cost ratios ranging from 2:1 to 22:1. Activities performed to protect public health and safety undoubtedly show the greatest return on investment although they are the most difficult to quantify. This investigation is focusing on the application of nonlethal and lethal methods used by WS personnel, and the use of nonlethal methods by others, mainly livestock producers. In the future, additional nonlethal methods are increasingly likely to be considered for application by WS personnel. These alternatives may be considerably more expensive than current lethal strategies. Accordingly, benefit:cost ratios for predation management will likely decline with increasing costs of management. Whether these ratios diminish sufficiently to warrant concern may be one of the factors to consider when deciding if alternative methods can be practically implemented, and for what purposes (e.g., livestock protection v. protection of threatened and endangered species).

Selected Publications:

- Blejwas, K.M., B.N. Sacks, M.M. Jaeger, and D.R. McCullough. 2002. The
 effectiveness of selective removal of breeding coyotes in reducing sheep
 predation. *Journal of Wildlife Management* 66(2):451-462.
- Schauster, E.R., E.M. Gese, and A.M. Kitchen. 2002. Population ecology of swift foxes (Vulpes velox) in southeastern Colorado. *Canadian Journal of Zoology* 80:307-319.
- Gese, E.M. 2001. Territorial defense by coyotes (Canis latrans): who, what, where, when, and why? *Canadian Journal of Zoology* 79:980-987.
- Gese, E.M. 2001. Monitoring of terrestrial carnivore populations. Pages 372-396 in Carnivore Conservation. Edited by J.L. Gittleman, S.M. Funk, D.W. Macdonald. and R.K. Wayne. Cambridge University Press. London.
- Gese, E.M. and F.F. Knowlton. 2001. The role of predation in wildlife population dynamics. Pages 7-25 in The Role of Predator Control as a Tool in Game Management. Edited by T.F. Ginnett and S.E. Henke. Texas Agricultural Research and Extension Center, San Angelo, TX.
- Green, J.S., F.F. Knowlton, and W.C. Pitt. 2001. Reproductive patterns among captive wild-caught coyotes (Canis latrans). *Journal of Mammalogy, in press*.
- Stoddart, L.C., R.E. Griffiths, and F.F. Knowlton. 2001. Coyote responses to changing jackrabbit abundance affect sheep predation. *Journal of Range* Management 54:15-2.